CLAIMS

WHAT IS CLAIMED IS:

1. A method for enzymatically inactivating a target DNA, comprising the steps of:

a) preparing a delivery vehicle containing a nuclease or a gene encoding a nuclease,

i) wherein said nuclease specifically recognizes and enzymatically inactivates said target DNA and

ii) wherein said nuclease encodes a DNA binding domain that specifically binds to a DNA sequence;

b) delivering the delivery vehicle containing a nuclease or a gene encoding a nuclease into cells; and

c) enzymatically inactivating said target DNA.

2. The method of claim 1, wherein said nuclease encodes a DNA binding protein selected from the group consisting of naturally occurring DNA-binding proteins and engineered or designed DNA-binding proteins.

3. The method of claim 2, wherein said naturally occurring DNA-binding proteins and engineered or designed DNA-binding proteins are selected from the group consisting of transcription repressor proteins, transcription activator proteins, telomere binding proteins, and DNA origin binding proteins.

4. The method of claim 3, wherein said DNA binding protein is an *ori* binding protein.

5. The method of claim 3, wherein said DNA binding protein is a telomere binding protein.

6. The method of claim 4, wherein said *ori* binding protein is selected from the group consisting of SV40 T antigen, HSV-I UL9 gene product, Varicella-Zoster gene 51 product, human herpes 6B CH6R gene product, Epstein-Barr virus EBNA-1 gene product, human papilloma virus E1 gene product, and human papilloma virus E2 gene product.

7. The method of claim 1, wherein said target DNA is selected from the group consisting of human immunodeficiency virus, hepatitis B, herpesviruses, polyoma viruses, and papilloma viruses.

8. The method of claim 1, wherein said target DNA is a gene selected from the group consisting of human, animal, viral, and bacterial genes.

9. A method for detecting a conformational change in a nucleic acid, comprising the steps of:

a) contacting a nucleic acid with a hybrid restriction nuclease, wherein said hybrid restriction nuclease interacts with nucleic acids having a conformational change by binding to and cleaving such nucleic acids;

b) determining whether said hybrid restriction nuclease has interacted with said nucleic acid; and

c) detecting conformational change in said nucleic acid.

10. The method of claim 9, wherein said conformational change in a nucleic acid is a mutation.

11. The method of claim 9, wherein said hybrid restriction nuclease comprises a nuclease domain linked to a DNA-binding protein that recognizes mismatches in DNA including single base mismatches,

single or multibase deletions, and single or multibase insertions.

12. The method of claim 11, wherein said nuclease domain is selected from the group consisting of naturally occurring proteins and engineered or designed nucleases.

13. The method of claim 9, wherein said hybrid restriction nuclease comprises an *Fok*I nuclease domain linked to a DNA-binding protein that recognize mismatches in DNA including single base mismatches, single or multibase deletions, and single or multibase insertions.

14. The method of claim 13, wherein said hybrid restriction nuclease is *Mut*S-F_N.

15. The method of claim 10, wherein the mutation is selected from the group consisting of a point mutation, a single or multiple base pair insertion, and a single or multibase deletion.

16. A hybrid molecule, comprising a sequence-specific nucleic acid binding protein joined to a detection domain.

17. The hybrid molecule of claim 16, wherein said sequence specific nucleic acid binding protein is a sequence specific DNA binding protein.

18. The hybrid molecule of claim 16, wherein the detection domain is an immunoglobulin molecule.

19. The hybrid molecule of claim 16, wherein said immunoglobulin molecule is the constant region of an immunoglobulin heavy chain molecule.

20. The hybrid molecule of claim 16, wherein the detection domain is a fluorescent molecule.

21. The hybrid molecule of claim 16, wherein the detection domain is a protein sequence known to bind specific antibody.

22. The hybrid molecule of claim 16, wherein the detection domain is a molecule known to interact with a substrate to generate a colormetric change in solution.